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Assessment of avitourism potential in Otavalo canton, Ecuador: A multi-criteria approach based on the analytic hierarchy process

Evaluación del potencial de aviturismo en el Cantón Otavalo, Ecuador: un enfoque multicriterio basado en el Proceso Analítico Jerárquico

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Abstract

Avitourism, an emerging form of ecotourism, integrates birdwatching with biodiversity conservation and local development. This study evaluates the potential for avitourism in the Otavalo canton, which is located in the Imbabura Province of the northern Andes in Ecuador. This region is part of the Tropical Andes biodiversity hotspot. A mixed-methods approach combining territorial characterization and the Analytic Hierarchy Process [AHP] was employed to perform multi-criteria weighting of potential avitourism indicators. Four main criteria were established: avifaunal richness and uniqueness, territorial conditions, local sociocultural capital, and the institutional framework. A panel of seven experts then performed pairwise comparisons to weight these criteria. The results indicate that avifaunal richness holds the highest weight (0.35), followed by territorial conditions (0.25), sociocultural capital (0.22), and the institutional framework (0.18). An Avitourism Potential Index [AvPI] was developed to classify the evaluated routes as having high, medium, or low potential. The findings show that the zones with the highest potential are located in the Mojanda system's protected areas and around San Pablo Lake. This study provides a replicable methodology for systematically assessing avitourism potential in Andean regions, thereby strengthening the technical basis for planning nature tourism in Ecuador.

Keywords: analytic hierarchy process, andean biodiversity, avitourism, Otavalo canton, tourism potential.

Resumen

El aviturismo es una modalidad emergente del ecoturismo que integra la observación de aves con la conservación de la biodiversidad y el desarrollo local. El presente estudio evalúa el potencial de aviturismo en el cantón Otavalo, situado en la provincia de Imbabura, en los Andes septentrionales del Ecuador, una región que forma parte del *hotspot* de biodiversidad de los Andes Tropicales. Se empleó un enfoque metodológico mixto que combina la caracterización territorial con el Proceso Analítico Jerárquico [AHP] para la ponderación multicriterio de los indicadores de potencial aviturístico. Se establecieron cuatro criterios principales: riqueza y singularidad avifaunística, condiciones territoriales, capital sociocultural local y marco institucional, que fueron ponderados por un panel de siete expertos mediante comparaciones pareadas. Los resultados muestran que la riqueza avifaunística es el criterio de mayor peso (0,35), seguido de las condiciones territoriales (0,25), el capital sociocultural (0,22) y el marco institucional (0,18). Se desarrolló un Índice de Poten-

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cial de Aviturismo [IPAV] que clasificó las rutas evaluadas en categorías de alto, medio y bajo potencial. Los hallazgos señalan que las zonas de mayor potencial se ubican en las áreas protegidas del sistema Mojanda y en los alrededores de la Laguna de San Pablo. Este estudio aporta una metodología replicable para la evaluación sistémica del potencial aviturístico en contextos andinos, fortaleciendo la base técnica para la planificación del turismo de naturaleza en Ecuador.

Palabras clave: aviturismo, biodiversidad andina, cantón Otavalo, potencial turístico, proceso analítico jerárquico.

1. Introduction

Avitourism, understood as the tourism activity focused on the observation and identification of birds in their natural habitat, has shown constant growth worldwide in recent decades (Sekercioglu, 2002). This type of ecotourism not only represents a source of income for local communities but also promotes ecosystem conservation by encouraging the protection of bird habitats (Steven et al., 2015). According to recent studies, millions of people practice birdwatching every year, generating an average expenditure higher than that of conventional tourism and making this activity a highly valuable alternative for destinations with high ornithological diversity (Newsome et al., 2012).

Ecuador stands out among the megadiverse countries of the world, with more than 1,660 recorded bird species in a relatively small territory (Myers et al., 2000). This biological richness is the result of different biogeographical factors, including the presence of the Tropical Andes, considered one of the 36 biodiversity hotspots with the highest levels of endemism on the planet (Stattersfield et al., 1998). In this context, avitourism emerges as a strategic alternative to diversify the national tourism offer and, at the same time, strengthen biodiversity conservation efforts (Cartay et al., 2020).

The Otavalo canton, located in the province of Imbabura, in the northern Andes of Ecuador, presents particularly favorable conditions for the development of avitourism. Its altitudinal range, from 1,800 to 4,700 m a.s.l., allows the presence of different ecosystems and a great variety of birds, from species typical of cloud forests to páramo birds and those found in agricultural areas (Caula, 2024). In addition, it has significant cultural richness, reflected in the Kichwa Otavalo community, internationally recognized for its textile tradition and for emblematic spaces such as the *Plaza de los Ponchos* artisan market. The combination of natural and cultural resources makes Otavalo a territory with high potential for integrating avitourism into community-based tourism initiatives (Vera Fernández et al., 2024).

Despite these characteristics, no studies have been found that systematically evaluate the avitourism potential of the Otavalo canton through multicriteria methodologies. Most studies conducted in Ecuador have focused on the Amazon region or coastal areas (Cartay et al., 2020; Rivera et al., 2025), leaving the northern Andean territories of the country largely unexplored. Furthermore, research on tourism potential in the region has been mainly descriptive or qualitative, without incorporating analytical tools that allow the objective weighting of different factors (Mejía Barreiros et al., 2024). This lack of comprehensive assessments hinders decision-making processes aimed at guiding investments and defining differentiated tourism development strategies.

The Analytic Hierarchy Process [AHP], proposed by Saaty and Vargas (2012), is a tool widely used for decision-making in multicriteria scenarios. Its main strength lies in its ability to decompose complex problems into hierarchical structures and assign relative weights based on comparisons made by experts (Ishizaka & Labib, 2011). In the tourism field, AHP has been successfully applied in destination assessment, route planning, and the definition of indicators for rural tourism and ecotourism (González et al., 2016; Vaidya & Kumar, 2006). However, its specific application to the analysis of avitourism potential in Ecuadorian Andean territories has not yet been reported in the reviewed scientific literature.

In this context, the present study aims to evaluate the avitourism potential in the Otavalo canton through a multicriteria approach based on the AHP method. The research provides an original contribution in three main aspects: (a) it constitutes the first application of AHP to evaluate avitourism potential in the Ecuadorian Andes; (b) it develops a Avitourism Potential Index [AvPI] based on indicators locally validated by experts from different disciplines; and (c) it proposes a replicable methodology that can be adapted to other territories with similar biophysical and sociocultural characteristics.

The document is structured into five main sections. Following the introduction, the methodology used is described, which includes the definition of criteria, the application of AHP, and the construction of the AvPI. Subsequently, the results of the multicriteria evaluation and territorial analysis are presented. The discussion section compares the findings with pre-

vious research, and finally, the conclusions and implications for avitourism planning in the Otavalo canton are presented.

2. Materials and Methods

2.1. Study area

The Otavalo canton is located in the province of Imbabura, in the northern Ecuadorian Andes, between the coordinates 0°13'S and 0°24'S latitude, and 78°15'W and 78°28'W longitude. It has an approximate area of 488 km² and an altitudinal range from 1,800 m a.s.l. in the valley areas to 4,723 m a.s.l. at the Mojanda volcano. The climate is temperate mountain climate, with annual precipitation ranging from 800 to 1,500 mm and average temperatures between 12 and 16 °C. These conditions favor the presence of diverse ecosystems, such as mountain cloud forests and Andean páramos (Fjeldsa, 2006).

Within the cantonal territory, there are several areas of relevance for conservation and avitourism, including the Mojanda Protected Forest, the Condor Park —a raptor bird rehabilitation center— and San Pablo Lake. The Mojanda lake system, composed of the Caricocha, Yanacocha, and Huarmicocha lagoons, contains Polylepis forests and extensive areas of grassland that serve as refuge for endemic and threatened species of Andean avifauna (Stattersfield et al., 1998). On the other hand, San Pablo Lake constitutes an important wetland for aquatic and migratory birds.

Furthermore, the geographical location of Otavalo, in a transition zone between the eastern and western slopes of the Andes, favors the presence of species characteristic of both regions, which increases the uniqueness of its avifaunal biodiversity (Caula, 2024).

2.2. Methodological design

The research was developed using a mixed-methods approach, integrating qualitative and quantitative tools in three consecutive phases. The first phase corresponded to the territorial diagnosis and included a literature review, cartographic analysis, and field reconnaissance to identify areas of avitourism interest. The second phase consisted of applying the AHP method to conduct a multicriteria evaluation, with the participation of an expert panel responsible for assigning weights to the defined criteria and indicators. Finally, the third phase involved constructing and applying the Avitourism Potential Index, and validating the results through triangulation with secondary sources and local stakeholders.

The integration of different methods allowed for a more comprehensive assessment of avitourism potential, considering not only the biophysical aspects of the territory but also the sociocultural and institutional dimensions. This methodological design follows the recommendations of Buckley (2010) for research related to conservation tourism, in which combining ecological and socioeconomic information is essential.

2.3. Definition of criteria and indicators

Based on the review of specialized literature (Sekercioglu, 2002; Puhakka et al., 2011; Cartay et al., 2020; Vera Fernández et al., 2024) and consultations with local experts, a hierarchical structure composed of four main criteria and twelve subcriteria was established to assess the avitourism potential of the territory. Table 1 presents a detailed description of each criterion and its subcriteria.

2.4. Expert panel and AHP application

To apply the AHP method, a panel of seven experts was formed, selected through criterion sampling. The experts were selected based on their professional experience (a minimum of ten years), their area of expertise, and their relationship with the study area. The group included two ornithologists with active research in the Ecuadorian Andes, two specialists in tourism planning with experience in nature-based tourism, a biologist focused on the conservation and management of protected areas in Imbabura, a representative of the Decentralized Autonomous Government of Otavalo, and an entrepreneur involved in community-based tourism. This diversity of backgrounds enabled the incorporation of various perspectives on the factors influencing the avitourism potential of the canton.

Each panel member performed pairwise comparisons among the four main criteria using the scale proposed by Saaty and Vargas (2012), which assigns values from 1 to 9 according to the level of relative importance of the compared elements. Table 2 shows the aggregated comparison matrix and the weights assigned to each criterion.

The eigenvector method was used to calculate these weights. This method consists of normalizing the columns of the matrix and averaging the values of each row to obtain the priority vector (Saaty, 2008).

The consistency of the assessments provided by the experts was evaluated using the consistency ratio [CR], calculated as $CR = {}^{CI}/_{RI}$, where CI corresponds

Table 1. Criteria and subcriteria for avitourism potential assessment.

Criterion	Subcriterion	Description
C1. Avifaunal richness and uniqueness (0.35)	C1.1. Species diversity	Number of species recorded in the evaluation area
	C1.2. Endemism	Presence of endemic species from the Andean region or the Tumbes-Chocó-Magdalena region
	C1.3. Emblematic species	Presence of species attractive to birdwatchers (hummingbirds, tanagers, condors)
C2. Territorial conditions (0.25)	C2.1. Accessibility	Quality of access roads and travel time from urban centers
	C2.2. Tourism infrastructure	Availability of accommodation, restaurants, interpretive trails, and viewpoints
	C2.3. Safety	Safety conditions for visitor transit and stay
C3. Local sociocultural capital (0.22)	C3.1. Community organization	Degree of community organization for tourism management
	C3.2. Local knowledge	Existence of local guides with avifaunal knowledge and associated cultural traditions
	C3.3. Hospitality	Willingness and capacity of communities to welcome visitors
C4. Institutional framework (0.18)	C4.1. Protection status	Presence of protected areas or conservation designations in the territory
	C4.2. Tourism policies	Existence of tourism planning instruments at the cantonal or provincial level
	C4.3. Conservation programs	Presence of active bird or ecosystem conservation projects

Table 2. Pairwise comparison matrix and criterion weights [AHP].

Criterion	C1	C2	C3	C4	weight
C1. Avifaunal richness	1	2	2	3	0.35
C2. Territorial conditions	1/2	1	1	2	0.25
C3. Sociocultural capital	1/2	1	1	1	0.22
C4. Institutional framework	1/3	1/2	1	1	0.18

to the consistency index and *RI* to the random index for matrices of order 4 (RI = 0.90). The result was CR = 0.03, a value lower than the 0.10, limit established by Saaty and Vargas (2012), which demonstrates an adequate level of consistency in the comparisons performed. Similarly, the weights of the subcriteria within each criterion were calculated, allowing the generation of a complete hierarchical structure with global weights for the twelve subcriteria defined in the study.

2.5. Construction of the Avitourism Potential Index

The Avitourism Potential Index [AvPI] was designed as a composite index that integrates the normalized assessment of each subcriterion and its relative weight obtained through the AHP (equation [1]).

$$\boldsymbol{AvPI} = \boldsymbol{\Sigma}\,(\boldsymbol{w_i} \times \boldsymbol{V_i}) \qquad [1]$$

Where w_i represents the global weight of subcriterion i and V_i corresponds to the normalized value of that subcriterion in the analyzed area.

Data normalization was performed using the min-max method, which transforms the original values to a scale between 0 and 1 using equation [2].

$$\boldsymbol{V_i} = (\boldsymbol{x_i} - \boldsymbol{x_{min}}) / (\boldsymbol{x_{max}} - \boldsymbol{x_{min}}) \qquad [2]$$

In this expression, x_i represents the observed value of the subcriterion, while x_{min} and x_{max} correspond to the minimum and maximum values recorded in all evaluated areas. The initial assessment of each subcriterion was performed using qualitative scales from 1 to 5, which were subsequently converted into quantitative values through a linear assignment function.

To interpret the results of the index, three categories of avitourism potential were established. The high category (AvPI Index ≥ 0.75) identifies areas with outstanding conditions for the development of avitourism; the medium category (0.50 ≤ AvPI Index < 0.75) corresponds to areas with significant potential, although with certain aspects that can be improved; and the low category (AvPI Index < 0.50) groups territories where limitations prevail over strengths. These ranges were defined considering the distribution of the values obtained and taking as reference the

methodologies used in similar studies on ecotourism assessment (Mejía Barreiros et al., 2024; Yépez & Carranco, 2025).

2.6. Validation

The results were validated through a triangulation process based on three main sources of information. First, the AvPI Index values were compared with bird records available on the eBird platform of the Cornell Lab of Ornithology, to verify the correspondence between the avifaunal diversity indices used and the data reported on this platform.

Second, the results obtained were compared with the findings of Caula (2024) regarding the distribution and diversity of birds in the province of Imbabura. Finally, semi-structured interviews were conducted with local stakeholders involved in nature-based tourism in the Otavalo canton, including community guides, tour operators, and representatives of parish boards. These interviews made it possible to contrast the classification obtained through the AvPI Index with the perceptions and knowledge of those who work directly in the territory.

3. Results

3.1. Weights of AHP criteria and subcriteria

Table 3 presents the distribution of the weights obtained through the application of the AHP method, including both the local weights of each criterion and the global weights of the subcriteria. The results show that the criterion related to avifaunal richness and uniqueness (C1) obtained the highest weighting (0.35), reflecting the consensus among experts regarding the importance of avifaunal diversity as the main factor in determining the avitourism potential of a territory. This finding is consistent with that reported by Puhakka et al. (2011) in studies on avitourism in Peru, where species diversity was also identified as the most relevant criterion.

Within criterion C1, the subcriterion with the highest weight was species diversity (C1.1), with a local weighting of 0.45. It was followed by endemism (C1.2), with 0.32, and the presence of emblematic species (C1.3), with 0.23. Regarding the territorial conditions criterion (C2), accessibility (C2.1) obtained the highest valuation (0.40), demonstrating the importance that experts attribute to road connectivity as a key element for the development of avitourism.

In the case of sociocultural capital (C3), the weights of the subcriteria were distributed in a relatively balanced manner, although community organization (C3.1) showed a slight advantage with a weighting of 0.38. Finally, within the institutional framework (C4), the existence of territorial protection statuses (C4.1) achieved the highest relative weight (0.42), highlighting the fundamental role played by protected areas as a support for the development of avitourism.

3.2. Territorial assessment of avitourism potential

The analysis considered five representative areas of the Otavalo canton, selected based on their ecological

Table 3. Local and global weights of AHP subcriteria.

Criterion	Subcriterion	Local Weight	Global Weight
C1 (0.35)	C1.1 Species diversity	0.45	0.158
	C1.2 Endemism	0.32	0.112
	C1.3 Emblematic species	0.23	0.080
C2 (0.25)	C2.1 Accessibility	0.40	0.100
	C2.2 Tourism infrastructure	0.35	0.088
	C2.3 Safety	0.25	0.062
C3 (0.22)	C3.1 Community organization	0.38	0.084
	C3.2 Local knowledge	0.35	0.077
	C3.3 Hospitality	0.27	0.059
C4 (0.18)	C4.1 Protection status	0.42	0.076
	C4.2 Tourism policies	0.33	0.059
	C4.3 Conservation programs	0.25	0.045

relevance, accessibility, and current tourism potential. Table 4 shows the AvPI Index values for each area, as well as the potential category assigned to each one.

The results show that two of the five evaluated areas, equivalent to 40%, present high potential for the development of avitourism: the Mojanda System (AvPI Index = 0.84) and San Pablo Lake (AvPI Index = 0.78). Both areas share characteristics such as high bird diversity, the presence of protection mechanisms, and favorable territorial conditions.

On the other hand, Condor Park, together with Imbabura Mountain (AvPI Index = 0.72), and the Quinchuquí Community (AvPI Index = 0.61), were classified as having medium potential. Finally, the urban area and the Otavalo Valley recorded the lowest index value (AvPI Index = 0.38), mainly due to strong human intervention and the lower availability of suitable natural habitats for avifauna.

Table 4. Avitourism Potential Index by evaluated zone.

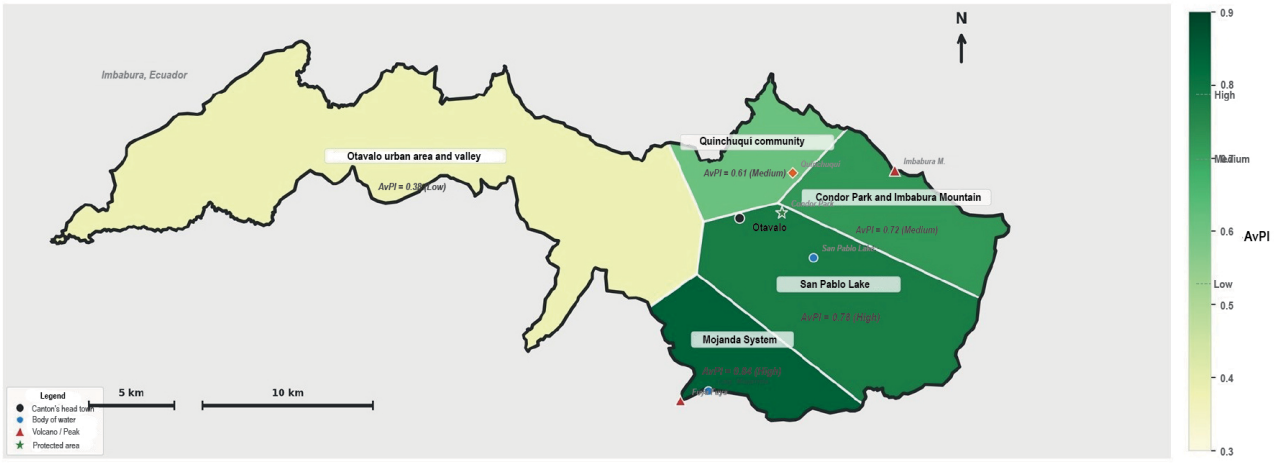
Zone	AvPI	Classification
Mojanda System (Protected Forest and lakes)	0.84	High
San Pablo Lake and surrounding areas	0.78	High
Condor Park and Imbabura Mountain	0.72	Medium
Quinchuquí community	0.61	Medium
Otavalo urban area and Valley	0.38	Low

3.3. Spatial distribution of potential

The spatial distribution of avitourism potential shows a pattern clearly associated with altitude. The areas with the highest potential are concentrated between 2,800 and 3,800 m a.s.l., especially in the cloud forest and high Andean páramo ecosystems of the Mojanda System. Medium-potential areas are located at intermediate altitudes, between 2,200 and 3,000 m a.s.l., while low-potential areas are mainly located in the inter-Andean valley, below 2,200 m a.s.l., where agricultural and urban expansion has considerably reduced the natural habitats available for birds. Figure 1 shows the spatial distribution of the AvPI Index in the cantonal territory.

It should be noted that the high-potential areas form a biocultural corridor that connects the Mojanda System with San Pablo Lake through páramos and forests located on the western slope of the Imbabura volcano. This corridor coincides with areas of high ecological sensitivity and territories inhabited by Indigenous communities that have maintained traditional soil management practices compatible with conservation. This situation represents a significant opportunity to develop avitourism circuits that integrate nature, culture, and community-based tourism (Vera Fernández et al., 2024).

Figure 1. Spatial distribution of the Avitourism Potential Index in Otavalo Canton, Imbabura, Ecuador.



Source: Prepared by the authors with field data and AHP (2024). Cartographic base: OpenStreetMap contributors.

3.4. Qualitative validation with local stakeholders

The triangulation with local stakeholders corroborated the findings of the AvPI Index. Guides, operators, and parish leaders confirmed that Mojanda and San Pablo are the areas with the greatest attraction, validating their high-potential category. However, the interviews provided nuances that the numerical index does not reflect: stakeholders indicated that these areas lack specialized infrastructure (C2), highlighting the shortage of interpretive signage, differentiated trails, and facilities such as viewpoints.

On the other hand, in medium-potential territories such as Quinchuquí, they valued community hospitality (C3) but identified a critical gap: there are no local guides trained in bird identification or proficient in English, which limits the ability to serve international tourists. Therefore, the perception of the urban valley fully coincided with the low potential indicated by the AvPI Index, attributed to habitat degradation. Overall, the qualitative validation demonstrates that high biological potential must be complemented with improvements in infrastructure and human capital development.

4. Discussion

4.1. Relevance of the multicriteria approach applied to Andean avitourism

The results obtained support the usefulness of the AHP method as a methodological tool for comprehensively evaluating avitourism potential in Andean territories. The ability to integrate biological, territorial, sociocultural, and institutional criteria within the same hierarchical structure makes it possible to overcome the limitations of more restricted approaches, which focus solely on species inventories or tourism infrastructure. This finding is consistent with the findings of González et al. (2016), who also demonstrated the effectiveness of AHP in studies on rural tourism and territorial management.

The distribution of weights obtained, in which biophysical criteria predominate over sociocultural and institutional criteria, reflects the practical perspective of the experts consulted. From this viewpoint, avifaunal richness constitutes the essential condition for promoting avitourism, although by itself it does not guarantee its development. This result partially differs from that reported by Mejía Barreiros et al. (2024), who found greater relevance of territorial conditions in Ecuador's protected areas, likely due to differences in the analyzed context and in the composition of the expert panels.

4.2. Dialogue with regional literature

The findings are consistent with several previous investigations on avitourism and tourism potential in Ecuador. Cartay et al. (2020), for example, identified the country as an internationally relevant destination for bird observation, although they highlighted the need for systematic assessments to guide territorial planning. In this regard, the present research contributes through a quantitative and spatially differentiated evaluation of avitourism potential in a specific territory of the northern Andes.

Similarly, Rivera et al. (2025) analyzed the avitourism potential of the Carrizal-Chone water corridor on the Ecuadorian coast using a multicriteria approach based on a composite index. Although they did not apply the AHP method, both studies agree on assigning a central role to avifaunal richness as the main criterion. However, differences can be observed in the importance assigned to institutional aspects, which, in the case of the coastal corridor, became more relevant due to the presence of various conservation designations.

Likewise, the information used to assess criterion C1 is consistent with the updated records reported by Caula (2024) for the province of Imbabura, where more than 350 bird species are documented, especially concentrated in cloud forest and paramo ecosystems. This agreement between scientific data and field observations strengthens the validity of the assessment conducted and the potential classification obtained.

4.3. Implications for conservation and local development

The identification of the Mojanda System and San Pablo Lake as high-potential avitourism areas has important implications for both conservation and local development. These areas coincide with highly sensitive ecological ecosystems, currently exposed to pressures derived from land-use change, agricultural expansion, and urban growth. Recognizing the tourism value of these spaces can generate economic incentives aimed at their conservation, demonstrating that environmental preservation can also constitute an opportunity for territorial development (Buckley, 2010; Kruger, 2005).

Furthermore, the integration of avitourism with community-based tourism initiatives, especially in areas such as Quinchuquí, opens the possibility of

diversifying rural economic activities and strengthening local economies. However, as Kruger (2005) points out, ecotourism does not automatically guarantee conservation; its success depends on appropriate planning processes that reduce negative impacts and promote an equitable distribution of benefits.

This validation with local stakeholders provides a clear lesson for Otavalo: having a high AvPI Index does not guarantee tourism success if action is not taken on the other criteria. As the interviewees pointed out, the Mojanda and San Pablo areas urgently require investment in basic infrastructure (C2.2) and, above all, training programs so that community guides (C3.2) can meet the specialized demand required by avitourism. Without this support, the high biological potential risks remain underutilized.

4.4. Study Limitations

This study presents some limitations that should be considered when interpreting the results. First, although the expert panel (n = 7) complies with the methodological recommendations of AHP (Saaty, 2008), the sample size remains limited and could restrict the representativeness of the weights obtained.

Second, the assessment did not incorporate a temporal dimension capable of reflecting the seasonal variability of avifauna, an aspect that is particularly important due to the altitudinal migrations of many Andean species. Likewise, part of the assessment of the subcriteria was based on secondary information and expert perceptions, which introduces a certain degree of subjectivity inherent to multicriteria methods. Finally, the spatial validation was constrained by the limited availability of detailed data on bird distribution at the local scale.

5. Conclusions

The present study evaluated the avitourism potential in the Otavalo canton through a multicriteria approach based on the Analytical Hierarchy Process [AHP], which constitutes the first application of this methodology to the analysis of avitourism in the Ecuadorian Andes. The results show that AHP is an effective tool for ranking and weighting criteria related to avitourism potential, as it allows the integration of biophysical, territorial, sociocultural, and institutional dimensions within a coherent and transparent analytical framework.

The weight structure obtained identifies avifaunal richness and uniqueness as the most important criterion (0.35), followed by territorial conditions (0.25), sociocultural capital (0.22), and the institutional framework (0.18). This prioritization reflects the importance that experts attribute to natural resources as the foundation for avitourism development, while recognizing the complementary role of territorial and sociocultural conditions.

The Avitourism Potential Index [AvPI] allowed the classification of the evaluated areas into three categories and identified the Mojanda System and San Pablo Lake as the areas with the greatest potential. Both form a biocultural corridor with broad possibilities for developing tourism circuits that integrate bird observation, community-based tourism, and Kichwa cultural heritage.

The main contributions of the study include: (a) the proposal of a locally validated hierarchical structure of criteria and indicators to evaluate Andean avitourism potential; (b) the development of a composite index that can be replicated in other territories with similar characteristics; and (c) a differentiated spatial classification that can serve as a tool for planning and decision-making in nature-based tourism.

Finally, future research is recommended to expand the expert panel, incorporate the seasonal variability of avifauna, and apply the AvPI Index in other cantons of the Ecuadorian Andes to assess its transferability. It would also be appropriate to complement the multicriteria analysis with more detailed geospatial tools and to develop studies on carrying capacity and socioeconomic impacts in the areas identified with the greatest potential, in order to promote sustainable avitourism management in the Otavalo canton.

Contributor roles

William Patricio Aguas Dias: conceptualization, data curation, formal analysis, investigation, methodology, project administration, resources, software, supervision, validation, visualization, writing – original draft, writing – review & editing.

Data Availability

The research described in the manuscript did not use any data.

Use of Artificial Intelligence

During the preparation of this manuscript the author used ChatGPT for writing purposes, at 11%. After using this tool/

service/software, the author reviewed and edited the content as needed, to avoid bias, errors, or fabrication of references, and takes full responsibility for the content of the published article.

Ethical Implications

The author declares that there are no ethical implications.

Conflict of Interest

The author declares that he has no affiliation with any organization with a direct or indirect financial interest that could have appeared to influence the work reported.

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